



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4**

Science and Ecosystem Support Division
Enforcement and Investigations Branch
980 College Station Road
Athens, Georgia 30605-2720

April 28, 1011

4SESD-EIB

MEMORANDUM

SUBJECT: Barite Hill Remedial Investigation Soil/Sediment/Surface Water
Sampling, QAPP transmittal
McCormick, South Carolina
SESD Project No. 11-0183

FROM: Brian Striggow, Environmental Engineer
Superfund and Air Section

THRU: Laura Ackerman, Chief
Superfund and Air Section

TO: Candice Jackson, Remedial Project Manager
Superfund Division

[Handwritten signatures: Brian Striggow, Doyle Jr, For, Laura Ackerman]

The attached Quality Assurance Project Plan (QAPP) describes the work to be performed and the procedures used in the investigation of the Barite Hill Site scheduled for the weeks of May 2 and May 9, 2011. If you have any questions or comments, please feel free to contact me at (706) 355-8619 or email striggow.brian@epa.gov.

cc:
Jim Eldridge, Black&Veatch
Tom Moyer, Black&Veatch

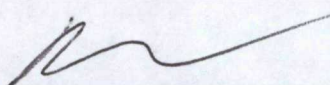
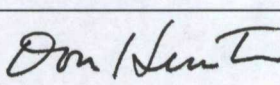
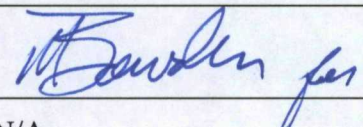
Attachment





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SECTION A: Project Planning Elements		
A1. Title (Project Name):	Barite Hills Remedial Investigation, Soil/Sediment/Surface Water Sampling	
Project Location:	McCormick, South Carolina	
Project Requestor and Organization:	Candice Jackson, Remedial Project Manager USEPA Superfund Division 61 Forsyth Street Atlanta, Georgia 30303	
Project Leader's Name, Position, and Organization:	Brian Striggow, Environmental Engineer USEPA Region 4 Science and Ecosystem Support Division Superfund and Air Section	
Project Leader's Signature:		Date: 4-28-11
Technical Reviewer's Name and Position:	Don Hunter, Environmental Scientist	
Technical Reviewer's Signature:		Date: 4/28/11
Section Chief's Name and Position:	Laura Ackerman Chief, Superfund and Air Section	
Section Chief's Signature:		Date: 4/28/11
A2. Table of Contents	N/A	
A3. Distribution List	Candice Jackson, USEPA Jim Eldridge, Black&Veatch Tom Moyer, Black&Veatch	
A4. Project Personnel	Organization	Responsibilities
Brian Striggow	USEPA	EPA Project Leader
Candice Jackson	USEPA	EPA Remedial Project Manager
Jim Eldridge	Black&Veatch	B&V RI Representative
Tom Moyer	Black&Veatch	B&V RI Representative

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Jen Hill	Black&Veatch	B&V RI Representative
Jamie Richardson	Black&Veatch	B&V RI Representative
Kevin Simmons	USEPA	Field Team Leader, SSO
Stacey Box	USEPA	Flow Measurement
Hunter Johnson	USEPA	Flow Measurement
Don Fortson	ESAT, ILS	ESAT Field Team Leader
Frank Allen	ESAT, ILS	ESAT Field Team Leader
Stephen Camp	ESAT, ILS	Sampler
Rashe Malcolm	ESAT, ILS	Sampler
Brian Herndon	ESAT, ILS	Sample Management
Ian Adams	ESAT, ILS	Field Chemist
Dannena Bowman	START, OTIE	Sampler
Jerome Partap	START, OTIE	Sampler
Additional Personnel*	ESAT, ILS	Sampler

*Additional personnel may be used as field conditions dictate. The additional personnel will be OSHA trained with suitable SESD authorizations for assigned tasks.

**A5. Problem Definition –
Investigation Objectives
and Background
Information:**

The background information below is excerpted primarily from:
 Black & Veatch
 FIELD SAMPLING PLAN (FSP)
 Barite Hill Goldfields
 Remedial Investigation and Feasibility Study
 Black & Veatch Project No. 049038.01.01.02.01
 DCN: 49038-0101-02-C-00377R0

The Barite Hill Goldfields site is a former gold and silver mining facility located in McCormick County, South Carolina. The Site is located approximately three miles southwest of the town of McCormick between highways US-378 and US-221.

The Barite Hill property covers approximately 795 acres, of which about 135 acres has been disturbed by historic and modern mining. The Barite Hill site operated from 1991 to 1995. In 1995, site reclamation activities at the Barite Hill site began. The Barite Hill mine was operated in historic times through underground workings and more recently as an open-pit and cyanide heap leach facility. Following the end of mining, the site was partially reclaimed prior to being abandoned by the operator in 1999.



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When the mine was abandoned, pumping of water in the main pit ceased and the pit began to flood, eventually forming an acidic lake approximately 10 acres in size. By 2007, the lake contained approximately 100 million gallons of water with a pH of between 2 and 2.2 and a high dissolved metal content; measurements by State personnel showed that lake pH decreased to values less than zero with depth. Because lake level was continuing to rise, the potential for overflow or a catastrophic release through failure of the pit wall became a serious concern, prompting EPA to initiate a time-critical removal action in 2008. This action included treating the pit water to near neutral pH, grading and covering waste rock dumps that were a major source of acidity to the lake and constructing a spillway to control releases to the northern unnamed tributary of Hawe Creek.

Seeps from the main pit containing acidic water with high dissolved metal content continue to discharge to the northern unnamed tributary of Hawe Creek, while waste rock dumps surrounding the eastern and southeastern portions of the Main Pit continue to be a source of acid rock drainage.

The Barite Hill mine site has contaminated on-site and downstream surface waters with acidity and heavy metals. Soil, sediment, shallow ground water (contained in unconsolidated materials), and deep ground water (contained in bedrock) are also likely to be impacted. Although most contaminants are expected to be metals, compounds such as cyanide, polychlorinated biphenyl compounds, and others may also be locally present.

In March 2007, EPA conducted a removal site evaluation at the Site. Activities included collecting surface water and sediment samples along unnamed tributaries of Hawe Creek, which receive runoff from the site, sediment samples from on-site ponds, and surface water samples from each of the on-site ponds, as well as collecting physical characterization and water quality data.

Constituents detected at elevated concentrations in surface water samples collected from unnamed tributaries of Hawe Creek include barium, copper, lead, selenium, and zinc. These surface water samples exceeded State of South Carolina water quality standards and/or EPA freshwater-surface water chronic screening values for hazardous waste sites.



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	<p>Analytical results for surface water samples collected from the on-site ponds contained arsenic, cadmium, chromium, copper, and cyanide. Sediment samples collected from the on-site ponds contained arsenic, cadmium, chromium, copper, lead, mercury, and cyanide. Analytical results for sediment samples collected from unnamed tributaries of Hawe Creek indicated the presence of chromium, copper, and lead at elevated concentrations.</p>
<p>A6. Project Description:</p>	<p>This SEDS project implements portions of a Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) prepared by Black & Veatch (B&V) in their design of a Remedial Investigation (RI) of the Barite Hills Site. Copies of the B&V FSP and QAPP are included in the project file. The most recent version of these documents are:</p> <p>Sampling and Analysis Plan Volume 1: Quality Assurance Project Plan(revised), Barite Hills Goldfield – DCN49038-0101-02-D-00377R1</p> <p>Sampling and Analysis Plan Volume 2: Field Sampling Plan, Barite Hills Goldfield – DCN49038-0101-02-D-00377R0</p> <p>In this mobilization The Science and Ecosystem Support Division (SESD) will work in conjunction with Black&Veatch personnel with the assistance of Environmental Sciences Assistance Team (ESAT) and Superfund Technical Assessment & Response Team (START) personnel. Remedial Investigation samples to be collected in this mobilization include surface soil samples, surface water samples from streams and seeps, stream sediment samples, and surface water and sediments from the main pit. These samples are shown in the following attachments excerpted from the B&V FSP and QAPP:</p> <p>FSP Table 3-2. Barite Hill RI/FS - Proposed Ground Water Samples (seeps)</p> <p>FSP Table 3-4. Barite Hill RI/FS - Proposed Soil Samples</p> <p>FSP Table 3-5. Barite Hill RI/FS - Proposed Surface Water Samples</p>



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	<p>FSP Table 3-6. Barite Hill RI/FS - Proposed Sediment Samples</p> <p>FSP Figure 3-2 Proposed Soil Sampling Locations - Initial Phase</p> <p>FSP FIGURE 3-3. Proposed Surface Water and Sediment Sampling Locations - Initial Phase</p> <p>Also attached for reference on laboratory methods is: FSP Table 3.3 - Summary of Samples, Analyses, Quality Control, and Containers (see section B4 for updated methods)</p> <p>This SESD QAPP covers the specific procedures and methods to be used in the execution of the above described sampling portion of the B&V FSP and QAPP.</p>
Applicable regulatory information, action levels, etc.	The purpose of this investigation is to provide data for site characterization. Relevant action levels will be used by Black&Veatch in the development of the Remedial Investigation Report.
Decision(s) to be made based on data:	Data is to be used to characterize the site in the development of the Barite Hill Site Remedial Investigation.
Field Study Date:	5/2/2011 to estimated 5/11/2011
Projected Lab Completion Date:	6/25/2011
Projected Final Report Completion Date:	7/15/2011 (Summary Data and Laboratory Results Only) The final report for this mobilization will consist of summary tables and a discussion of Quality Control issues. Data will be subsequently electronically transferred to Black&Veatch.
A7. Quality Objectives and Criteria All samples/sample locations meet the field investigation objectives and purposes summarized in Sections A5 and A6 of this QAPP.	
A8. Special Training/Certifications N/A.	
A9. Documents and Records	



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For this project, SESD will implement the following procedures pertaining to Documents and Records:

SESD Operating Procedure for Report Preparation and Distribution, SESDPROC-003-R3.

SESD Operating Procedure for Logbooks, SESDPROC-010-R4.

SESD Operating Procedure for Control of Records, SESDPROC-002-R5.

SECTION B: Data Generation and Acquisition

B1. Sampling Design

The following matrix lists the proposed numbers and types of samples to be collected. Sample locations are described in Section A6 of this QAPP.

Media:	Number of Samples:	Analyses:
Sediment (see table 3-6)	18	TM, Paste pH, Acid Base Accounting (ABA), TOC, Nutrients (Tot P, TKN), Tot CN, WAD CN, VOC / SVOC, Pest / PCB
Soil (see table 3-4)	44	TM, Paste pH, Acid Base Accounting (ABA), TOC, Nutrients (Tot P, TKN), Tot CN, WAD CN, VOC / SVOC, Pest / PCB
Surface Water (see tables 3-2, 3-5)	40	TM, Filt Met, Anions, Acidity, Alkalinity, TDS/TSS, Field Param (incl tot & ferrous Fe), Tot CN, Free CN



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B2.0 Sampling Methods, General Procedures

The following SESD field measurement and sampling procedures will be followed during this field study, as applicable:

Field pH Measurement	SESDPROC-100-R2
Field Specific Conductance Measurement	SESDPROC-101-R2
Field Temperature Measurement	SESDPROC-102-R3
Field Turbidity Measurement	SESDPROC-103-R2
Field Measurement of Dissolved Oxygen	SESDPROC-106-R2
Global Positioning System	SESDPROC-110-R3
Field Measurement of Oxidation-Reduction Potential (ORP)	SESDPROC-113-R0
Sediment Sampling	SESDPROC-200-R2
Surface Water Sampling	SESDPROC-201-R1
Pump Operation	SESDPROC-203-R2
Soil Sampling	SESDPROC-300-R1
Hydrological Studies	SESDPROC-501-R2

B2.1 Sampling Methods, Specific Procedures

B2.1.0 Global Positioning System

All sample points will be surveyed using mapping grade GPS receivers. All position fixes will be differentially corrected, either by post-correction, or preferentially, by use of real-time Wide-Area Augmentation System (WAAS) correction. Expected accuracy is on the order of 1 meter.

B2.1.1 Soil Sampling

Soil samples specified in B&V FSP Table 3-4 (attached) and shown in B&V FSP Figure 3-2 (attached) will be collected with stainless steel hand augers and mixed with stainless steel spoons in glass pans. Encores® will be used for collection of material for Volatile Organic Compound analysis prior to sample mixing. Decisions on discrete vs composite and number of aliquots may be altered using the best professional judgement of the sampling team leader.

B2.1.2 Surface Water Sampling

It is expected that a variety of methods may be used for collection of surface water samples. Depending on depth and other factors, samples may be collected by pumping with peristaltic pumps (using vacuum caps for organics and 'soda-strawing' of VOCs), direct filling of bottles, or transferring from stainless steel scoops. Filtered metal samples will preferentially be filtered using 0.45um filters at the time of collection, but may be filtered later in the same day prior to preservation.

B2.1.3 Sediment Sampling

Depending on the water depth and other factors, sediment samples may be collected with stainless steel



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spoons, stainless steel scoops, or ponar dredges. Field notes should document the apparent efficacy of sampling, particularly for the waste pit sampling.

B2.1.4 Total and Ferrous Iron

Total and Ferrous Iron will be analyzed in the field using Hach Method 8146 for ferrous iron and Hach Method 8112 for total iron. Containers, preservation, and Quality Control will be per the specified methods.

B2.1.4 Discharge Measurement

Where possible, discharge measurements will be made using an Acoustic Doppler Velocimeter. In cases of small flows, v-notch weirs or direct timed measurements in containers may be used.

B3. Sampling Handling and Custody

All samples will be collected and handled according to the procedures listed in Section B2 of this QAPP. After collection, samples will be managed according to the following:

SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual, January 2010.

SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005-R1.

SESD Operating Procedure for Packing, Labeling and Shipping of Environmental and Waste Samples SESDPROC-209-R1.

B4. Analytical Methods

The following is a brief description of the analytical methods for this field investigation.

SESD:	As applicable- VOCs, SVOCs, Pesticides, PCBs: TDS, TSS, Total Metals, Total Cyanide, Acidity, Alkalinity: Samples will be analyzed in accordance with the <i>SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual</i> , January 2010. Methods used are equivalent to or return equivalent reporting levels as those specified in B&V QAPP.
CLP:	As applicable- VOCs, SVOCs, Pesticides, PCBs: CLP SOM01.2
Other:	Field Chemistry: Field Ferrous Iron: Hach Method 8146 Field Total Iron: Hach Method 8112 The following analyses are booked and contracted out through B&V: Soils: Paste pH, ABA, Tot CN, Weak Acid Dissociable(WAD) CN Water: TM, Filt Met, Anions(Sulfate, chloride), Acidity, Alkalinity, TDS, TSS, Nitrate/Nitrite Ammonia See attached FSP Table 3.3 - Summary of Samples, Analyses, Quality Control, and



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	<p>Containers for methods for the B&V booked samples. B&V will perform data validation for these samples.</p> <p>The following methods have been updated from those specified in FSP Table 3.3:</p> <p>Ammonia: EPA 350.1</p> <p>Acidity: SM2310B</p> <p>Alkalinity: EPA 310.2</p> <p>TDS: SM2540C</p> <p>TSS: SM2540D</p>
B5. Quality Control The following is a brief description of field and laboratory quality control measures to be implemented during this field investigation.	
Field:	<p>Field quality control measures will be in accordance with the <i>SESD Operating Procedure for Field Sampling Quality Control</i>, SESDPROC-011-R3, and/or <i>40 CFR Part 136.3, Table II-Required Containers, Preservation Techniques, and Holding Times</i>, as applicable.</p> <p>The number and type of field quality control samples proposed for this investigation are as follows:</p> <p>Split samples are to be collected for each media at a rate of (1) split sample to (10) to (20) field samples. Where organic analyses are booked for only a subset of samples, at least one sample will include analysis for organics.</p> <p>Since field sampling equipment is included in the SESD quality system and is regularly rinse blanked, the collection of field rinse blanks is not anticipated.</p> <p>An estimated (1) – (2) VOC trip blanks will be shipped.</p> <p>A preservative blank will be processed for each preservative type from each preservative batch used.</p> <p>Matrix spike and matrix spike duplicate samples will be collected at the rate of (1) per (20) samples for appropriate analyses.</p>
Laboratory:	<p>Specific laboratory quality control measures are specified in the <i>SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual</i>, January 2010.</p>
B6. Instrument/Equipment Testing, Inspection and Maintenance All field measurement instruments and equipment will be maintained in accordance with the <i>SESD</i>	



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Operating Procedure for Equipment Inventory and Management, SESDPROC-108-R3.

B7. Instrument/Equipment Calibration and Frequency

All field measurement instruments and equipment are calibrated according to the *SESD Operating Procedure for Equipment Inventory and Management, SESDPROC-108-R3* and according to specific procedures included within the defined operating procedures for each instrument (see specific field measurement procedures in Section B2 of this QAPP).

B8. Inspection/Acceptance for Supplies and Consumables

All critical supplies and consumables for this field investigation are inspected and maintained in accordance with the following procedures:

SESD Operating Procedure for Purchasing of Services and Supplies, SESDPROC-015-R3.

SESD Operating Procedure for Equipment Inventory and Management, SESDPROC-108-R3

SESD Operating Procedure for Field Sampling Quality Control, SESDPROC-011-R3.

The SESD Field Quality Manager and the Branch Quality Assurance Officers are responsible for ensuring that these requirements are met.

B9. Non-direct Measurements: N/A for this category.

B10. Data Management

The field project leader will be responsible for ensuring that all requirements for data management are met. All data generated for this field investigation, whether hand-recorded or recorded and stored in an electronic data logger will be recorded, stored and managed according to the following procedures:

SESD Operating Procedure for Control of Records, SESDPROC-002-R5.

SESD Operating Procedures for Logbooks, SESDPROC-010-R4.

SECTION C: Assessment/Oversight



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C1. Assessments and Response Actions

Assessments will be conducted during the field investigation according to the *SESD Operating Procedure for Project Planning*, SESDPROC-016-R2, to ensure the QAPP is being implemented as approved. The Project Leader is responsible for all corrective actions while in the field.

C2. Reports to Management

The Project Leader will be responsible for notifying the Project Manager (Requestor) and appropriate SESD management if any circumstances arise during the field investigation that may adversely impact the quality of the data collected.

SECTION D: Data Validation and Usability

D1. Data Review, Verification, and Validation

All analytical data will be provided by the SESD Analytical Support Branch and reviewed, verified and validated in accordance with the *SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual*, January 2010.

All data derived from SESD field measurements will be reviewed, verified, and validated in accordance with the *SESD Operating Procedure for Report Preparation and Distribution*, SESDPROC-003-R3.

D2. Verification and Validation Methods

All analytical data will be provided by the SESD Analytical Support Branch and reviewed, verified and validated in accordance with the *SESD Analytical Support Branch Laboratory Operations and Quality Assurance Manual*, January 2010.

All data derived from SESD field measurements will be reviewed, verified, and validated in accordance with the *SESD Operating Procedure for Report Preparation and Distribution*, SESDPROC-003-R3.

D3. Reconciliation with User Requirements

The usability of all data derived from SESD field sampling and measurements conducted during this field investigation will be evaluated in accordance with the *SESD Operating Procedure for Report Preparation and Distribution*, SESDPROC-003-R3.

****Footnotes:** This Quality Assurance Project Plan (QAPP) has been prepared and approved according to the EPA *Requirements for Quality Assurance Project Plans (EPA QA/R5 EPA/240/B-01/003)*, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, March 2001(USEPA, 2001). This document will be used to ensure that the environmental data collected for this project are of the type and quality for the intended purposes. **This document is for SESD use only.**

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Table 3-2. Barite Hill RI/FS - Proposed Ground Water Samples

See below for parameter list

Existing Monitoring Wells

Station	Media	Sample Type	Total Metals	SVOC, VOC, Pest/PCBs	Anions	Total Acidity	Total Alkalinity	TDS & TSS	Field Parameters	Ground Water Elevation	Total & Free CN	Nitrate Nitrite Ammonia	Approximate Coordinates (Easting,Northing)	
BHMW-1	GW	Discrete	X		X	X	X	X	X	X	X	X	1607123	745554
BHMW-2	GW	Discrete	X		X	X	X	X	X	X	X	X	1607090	745546
BHMW-3	GW	Discrete	X		X	X	X	X	X	X	X	X	1607182	745216
BHMW-4	GW	Discrete	X		X	X	X	X	X	X	X	X	1607141	745188
BHMW-5	GW	Discrete	X	X	X	X	X	X	X	X	X	X	1604557	744782
GW-1	GW	Discrete	X		X	X	X	X	X	X	X	X	1606755	745939
GW-2	GW	Discrete	X		X	X	X	X	X	X	X	X	1607351	746290
GW-3	GW	Discrete	X		X	X	X	X	X	X	X	X	1604001	743743
MW-A1	GW	Discrete	X	X	X	X	X	X	X	X	X	X	1606879	744647
MW-A2	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-A3	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-B1	GW	Discrete	X		X	X	X	X	X	X	X	X	1606300	743362
MW-B2	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-C1	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-C2	GW	Discrete	X		X	X	X	X	X	X	X	X	1607005	743178
MW-D1	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-D2	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-D3	GW	Discrete	X		X	X	X	X	X	X	X	X	1607442	743905
MW-E1	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-E2	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-E3	GW	Discrete	X		X	X	X	X	X	X	X	X	1606300	743362
MW-E4	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-F1	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-F2	GW	Discrete	X		X	X	X	X	X	X	X	X	1605749	743913
MW-F3	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-G1	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-G2	GW	Discrete	X		X	X	X	X	X	X	X	X	1606173	743394
MW-G3	GW	Discrete	X		X	X	X	X	X	X	X	X		
MW-H	GW	Discrete	X	X	X	X	X	X	X	X	X	X		
MW-I	GW	Discrete	X		X	X	X	X	X	X	X	X	1605207	744369
MW-J	GW	Discrete	X	X	X	X	X	X	X	X	X	X	1605743	744731
MW-L	GW	Discrete	X		X	X	X	X	X	X	X	X	1605447	744741
MW-M	GW	Discrete	X		X	X	X	X	X	X	X	X	1607216	743680
MW-N	GW	Discrete	X		X	X	X	X	X	X	X	X	1607581	744170
													1606486	743162

Table 3-2. Barite Hill RI/FS - Proposed Ground Water Samples, continued

Seeps and potential seepage areas

Station	Media	Sample Type	Total Metals	Filtered Metals	Anions	Total Acidity	Total Alkalinity	TDS & TSS	Field Parameters	Seep Discharge	Total & Free CN	Nitrate Nitrite Ammonia	Comments
BG501	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField
BG502	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField
BG503	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField
BG504	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField, and may include SVOC/VOC
BG505	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField
BG506	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField
BG507	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField
BG508	GW	Discrete	X	X	X	X	X	X	X	X	X	X	TBD in theField

Parameter List

Metals		Anions	Others	Field Parameters	Abbreviations
Aluminum	Magnesium	Sulfate	TDS	pH	ABA - Acid base accounting (includes sulfur forms)
Antimony	Manganese	Chloride	TSS	Specific Conduct.	CN - Cyanide
Arsenic	Mercury	Nitrate-N	Total Acidity	Temperature	PCBs - Polychlorinated biphenyls
Barium	Molybdenum	Nitrite-N	Total Alkalinity	Eh/ORP downhole	Pest - Pesticides
Beryllium	Nickel	Ammonia-N	Total CN	Ferrous Iron	SVOC - Semi-volatile organic compounds
Cadmium	Potassium		Free CN	Total Iron	VOC - Volatile organic compounds
Calcium	Selenium		Discharge (seeps)	Turbidity	TSS - Total suspended solids
Chromium	Silver			Dissolved Oxygen	TDS - Total dissolved solids
Cobalt	Sodium				N - Nitrogen
Copper	Thallium				TBD - To be determined
Iron	Vanadium				
Lead	Zinc				

Note: Individual wells within clusters will need to be identified and GPS'ed

Table 3-4. Barite Hill RI/FS - Proposed Soil Samples

See below for Parameter List

Includes Reclaimed Area Soil Covers - eroded and non-eroded; Former Shops, facilities, and Process Areas;
and Background samples

Station	Media	Sample Type	Depth	Total Metals	Paste pH	ABA	TOC	Nutrients	Total & WAD CN	SVOC / VOC	Pest. & PCB	Approximate Coordinates (Easting, Northing)	
BH401	SL	3 pt comp	0-6 in.	X	X		X	X				1607471	745242
BH402	SL	3 pt comp	0-6 in.	X	X		X	X				1607046	745445
BH403	SL	3 pt comp	0-6 in.	X	X		X	X				1606804	745314
BH404	SL	3 pt comp	0-6 in.	X	X		X	X				1607059	745157
BH405	SL	3 pt comp	0-6 in.	X	X		X	X		X	X	1606883	744661
BH406	SL	3 pt comp	0-6 in.	X	X		X	X		X	X	1606981	744537
BH407	SL	Discrete	0-6 in.	X	X							1606560	744681
BH408	SL	3 pt comp	0-6 in.	X	X							1607656	744543
BH409	SL	Discrete	0-6 in.	X	X		X	X				1608118	744713
BH410	SL	3 pt comp	0-6 in.	X	X				X			1606879	744121
BH411	SL	3 pt comp	0-6 in.	X	X	X			X			1607022	743868
BH412	SL	Discrete	0-6 in.	X	X				X	X	X	1607054	743749
BH413	SL	Discrete	0-6 in.	X	X	X			X			1605549	743942
BH414	SL	Discrete	0-6 in.	X	X	X			X			1606730	743780
BH415	SL	Discrete	0-6 in.	X	X							1606660	743134
BH416	SL	3 pt comp	0-6 in.	X	X							1606341	743352
BH417	SL	3 pt comp	0-6 in.	X	X	X	X	X	X			1606431	743996
BH418	SL	3 pt comp	0-6 in.	X	X	X			X			1606025	743772
BH419	SL	3 pt comp	0-6 in.	X	X	X			X	X	X	1605990	744308
BH420	SL	3 pt comp	0-6 in.	X	X	X			X	X		1606125	744373
BH421	SL	3 pt comp	0-6 in.	X	X	X			X	X	X	1606038	744531
BH422	SL	3 pt comp	0-6 in.	X	X	X			X	X		1605769	744299
BH423	SL	3 pt comp	0-6 in.	X	X	X	X	X				1605466	744280
BH424	SL	3 pt comp	0-6 in.	X	X	X						1605655	744574
BH425	SL	Discrete	0-6 in.	X	X				X	X	X	1605190	744772
BH426	SL	Discrete	0-6 in.	X	X					X	X	1605072	744733
BH427	SL	Discrete	0-6 in.	X	X				X	X	X	1605079	744811
BH428	SL	Discrete	0-6 in.	X	X				X			1605207	744369
BH429	SL	Discrete	0-6 in.	X	X	X	X	X	X			1606675	743754
BH430	SL	3 pt comp	0-6 in.	X	X	X	X	X	X			1605493	743784
BH431	SL	3 pt comp	0-6 in.	X	X	X			X			1605187	743603
BH432	SL	Discrete	0-6 in.	X	X							1604725	743176
BH433	SL	Discrete	0-6 in.	X	X							1604857	743311
BH434	SL	Discrete	0-6 in.	X	X				X			1604891	743502
BH435	SL	3 pt comp	0-6 in.	X	X	X			X			1604593	743658
BH436	SL	Discrete	0-6 in.	X	X							1604790	744470

**Includes Reclaimed Area Soil Covers - eroded and non-eroded; Former Shops, facilities, and Process Areas;
and Background samples**

Station	Media	Sample Type	Depth	Total Metals	Paste pH	ABA	TOC	Nutrients	Total & WAD CN	SVOC / VOC	Pest. & PCB	Approximate Coordinates (Easting, Northing)	
BH437	SL	3 pt comp	0-6 in.	X	X	X	X	X	X			1604688	744244
BH438	SL	Discrete	0-6 in.	X	X							1604470	744432
BH439	SL	3 pt comp	0-6 in.	X	X	X	X	X	X	X	X	1604360	744197
BH440	SL	Discrete	0-6 in.	X	X							1603933	743800
BH441	SL	Discrete	0-6 in.	X	X				X			1603781	743826
BH442	SL	Discrete	0-6 in.	X	X		X	X				1603223	744667
BH443	SL	Discrete	0-6 in.	X	X		X	X				1602925	745129
BH444	SL	Discrete	0-6 in.	X	X		X	X				1603909	744615

Parameter List

Total Metals		Acid-Base Accounting	Nutrients	Abbreviations
Aluminum	Magnesium	Neutraliz. Potential	Total phosphorous	ABA - Acid base accounting (includes sulfur forms
Antimony	Manganese	Total Sulfur	Total Kjeldahl Nitrogen	CN - Cyanide
Arsenic	Mercury	Pyrite Sulfur	Total Organic Carbon	PCBs - Polychlorinated biphenyls
Barium	Molybdenum	Sulfate Sulfur		Pest - Pesticides
Beryllium	Nickel	Organic Sulfur	Others	SVOC - Semi-volatile organic compounds
Cadmium	Potassium		Total & WAD CN	VOC - Volatile organic compounds
Calcium	Selenium		SVOC	TSS - Total suspended solids
Chromium	Silver		VOC	TDS - Total dissolved solids
Cobalt	Sodium		Pesticides & PCB	N - Nitrogen
Copper	Thallium			
Iron	Vanadium			
Lead	Zinc			

Table 3-5. Barite Hill RI/FS - Proposed Surface Water Samples

See below for parameter list

Main Pit Water Samples

Station	Media	Sample Type	Total Metals	Filtered Metals	Anions	Total Acidity	Total Alkalinity	TDS & TSS	Field Parameters	Discharge	Total & Free CN	Nitrate Nitrite Ammonia	SVOC / VOC	Pest & PCBs	Comment ^a
BH101-1	SW	Discrete	X	X	X	X	X	X	X		X	X	X	X	from platform at surface
BH101-2	SW	Discrete	X	X	X	X	X	X	X		X	X			from platform at approx 20 ft depth
BH101-3	SW	Discrete	X	X	X	X	X	X	X		X	X			from platform at approx 40 ft depth
BH102-1	SW	Discrete	X	X	X	X	X	X	X		X	X			at shore near spillway
BH102-2	SW	Discrete	X	X	X	X	X	X	X		X	X			adjacent to shore at approx 10 ft depth
BH102-3	SW	Discrete	X	X	X	X	X	X	X		X	X			adjacent to shore 3 ft from bottom
BH103-1	SW	Discrete	X	X	X	X	X	X	X		X	X			at shore near wells
BH103-2	SW	Discrete	X	X	X	X	X	X	X		X	X			adjacent to shore at approx 10 ft depth
BH103-3	SW	Discrete	X	X	X	X	X	X	X		X	X			adjacent to shore 3 ft from bottom
BH104-1	SW	Discrete	X	X	X	X	X	X	X		X	X			at shore south point
BH104-2	SW	Discrete	X	X	X	X	X	X	X		X	X			adjacent to shore at approx 10 ft depth
BH104-3	SW	Discrete	X	X	X	X	X	X	X		X	X			adjacent to shore 3 ft from bottom

Process Pond Water Samples and other standing water

Station	Media	Sample Type	Total Metals	Filtered Metals	Anions	Total Acidity	Total Alkalinity	TDS & TSS	Field Parameters	Discharge	Total & Free CN	Nitrate Nitrite Ammonia	SVOC / VOC	Pest & PCBs	Comment
BH105	SW	5-pt composite	X		X	X	X	X	X		X	X			in permanent pregnant pond
BH106	SW	5-pt composite	X		X	X	X	X	X		X	X	X	X	in permanent rinse pond
BH107	SW	5-pt composite	X		X	X	X	X	X		X	X			in permanent barren pond
BH108	SW	5-pt composite	X		X	X	X	X	X		X	X	X	X	in reusable pregnant pond
BH109	SW	5-pt composite	X		X	X	X	X	X		X	X			in reusable barren pond
BH110	SW	5-pt composite	X		X	X	X	X	X		X	X			in reusable rinse pond 1
BH111	SW	5-pt composite	X		X	X	X	X	X		X	X			in reusable rinse pond 2
BH112	SW	Discrete	X		X	X	X	X	X		X	X			in overflow pond
BH132	SW	Discrete	X		X	X	X	X	X		X	X			in pond depression
BH133	SW	Discrete	X		X	X	X	X	X		X	X			in pond wetland
BH134	SW	Discrete	X		X	X	X	X	X		X	X			

Surface Waters in Streams Draining the Site

Station	Media	Sample Type	Total Metals	Filtered Metals	Anions	Total Acidity	Total Alkalinity	TDS & TSS	Field Parameters	Discharge	Total & Free CN	Nitrate Nitrite Ammonia	SVOC / VOC	Pest & PCBs	Approximate Coordinates (Easting,Northing)	
BH113	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1607757	745746
BH114	SW	Discrete	X	X	X	X	X	X	X		X	X			1607720	746139
BH115	SW	Discrete	X	X	X	X	X	X	X		X	X			1607529	746285
BH116	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1607389	746488
BH117	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1607236	746373
BH118	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1607047	746270
BH119	SW	Discrete	X	X	X	X	X	X	X	X	X	X	X	X	1606407	745783
BH120	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1605587	745433
BH121	SW	Discrete	X	X	X	X	X	X	X		X	X			1604451	745476
BH122	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1602969	745154
BH123	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1602914	745090
BH124	SW	Discrete	X	X	X	X	X	X	X	X	X	X	X	X	1602960	745493
BH125	SW	Discrete	X	X	X	X	X	X	X		X	X			1602638	745251
BH126	SW	Discrete	X	X	X	X	X	X	X	X	X	X	X	X	1601956	745099
BH127	SW	Discrete	X	X	X	X	X	X	X	X	X	X	X	X	1603739	743728

Surface Waters in Streams Draining the Site

Station	Media	Sample Type	Total Metals	Filtered Metals	Anions	Total Acidity	Total Alkalinity	TDS & TSS	Field Parameters	Discharge	Total & Free CN	Nitrate Nitrite Ammonia	SVOC / VOC	Pest & PCBs	Approximate Coordinates (Easting, Northing)	
BH128	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1603924	743797
BH129	SW	Discrete	X	X	X	X	X	X	X	X	X	X			1603972	743348
BH130	SW	Discrete	X	X	X	X	X	X	X		X	X			1606453	742390
BH131	SW	Discrete	X	X	X	X	X	X	X		X	X	X	X	1600103	744373
BH135	SW	Discrete	X	X	X	X	X	X	X		X	X			1605154	745377

Parameter List

Total and Dissolved Metals

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead

Magnesium
Manganese
Mercury
Molybdenum
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc

Anions

Sulfate
Chloride
Nitrate-N
Nitrite-N
Ammonia-N

Others

TDS
TSS
Total Acidity
Total Alkalinity
Total CN
Free CN
Discharge
SVOC / VOC
Pest. & PCBs

Field Parameters

pH
Specific Conduct.
Temperature
Eh/ORP
Turbidity
Total Fe
Ferrous Fe
Dissolved Oxygen

Abbreviations

ABA - Acid base accounting (include: Total & WAD CN)
CN - Cyanide
PCBs - Polychlorinated biphenyls
Pest - Pesticides
SVOC - Semi-volatile organic compounds
VOC - Volatile organic compounds
TSS - Total suspended solids
TDS - Total dissolved solids
N - Nitrogen
TBD - To be determined

Others

SVOC
VOC
Pesticides & PCB

a - Actual sample depths in the main pit will be dependent on the location of the chemocline.

Table 3-6 (revised 4-26) Proposed Sediment Samples

Sediments in Main Pit											
Station	Media	Sample Type	Depth	Total Metals	Paste pH	ABA	TOC	SVOC / VOC	Pest. & PCBs	Total & WAD CN	Comments
BH202	SD	Discrete	0-6 in.	X	X	X		X	X	X	at shore near spillway
BH203	SD	Discrete	0-6 in.	X	X	X				X	at shore near wells
BH204	SD	Discrete	0-6 in.	X	X	X				X	at shore south point

Process Ponds Sediment												
Station	Media	Sample Type	Depth	Total Metals	Paste pH	ABA	TCLP	SVOC / VOC	Pest. & PCBs	Total & WAD CN	Gold (Au) Fire Assay	Comments
BH205	SD	Composite	to liner	X			X	X		X		in permanent pregnant pond
BH205A-P	SD	Discretes	to liner								X	in permanent pregnant pond n=16
BH206	SD	Composite	to liner	X			X	X	X	X		in permanent rinse pond
BH207	SD	Composite	to liner	X			X			X		in permanent barren pond
BH208	SD	Composite	to liner	X			X	X		X		in reusable pregnant pond
BH208A-P	SD	Discretes	to liner								X	in reusable pregnant pond n=16
BH209	SD	Composite	to liner	X			X			X		in reusable barren pond
BH210	SD	Composite	to liner	X			X			X		in reusable rinse pond 1
BH211	SD	Composite	to liner	X			X			X		in reusable rinse pond 2
BH212	SD	Composite	0-6 in.	X			X			X		in overflow pond

Sediments in perennial streams draining the site												
Station	Media	Sample Type	Depth	Total Metals	Paste pH	ABA	TOC	SVOC / VOC	Pest. & PCBs	Total & WAD CN		Approximate Coordinates (Easting, Northing)
BH213	SD	Discrete	0-6 in.	X	X		X			X		1607757 745746
BH214	SD	Discrete	0-6 in.	X	X					X		1607720 746139
BH215	SD	Discrete	0-6 in.	X	X					X		1607529 746285
BH216	SD	Discrete	0-6 in.	X	X					X		1607389 746488
BH217	SD	Discrete	0-6 in.	X	X					X		1607236 746373
BH218	SD	Discrete	0-6 in.	X	X					X		1607047 746270
BH219	SD	Discrete	0-6 in.	X	X		X	X	X	X		1606407 745783
BH220	SD	Discrete	0-6 in.	X	X					X		1605587 745433
BH221	SD	Discrete	0-6 in.	X	X					X		1604451 745476
BH222	SD	Discrete	0-6 in.	X	X					X		1602969 745154
BH223	SD	Discrete	0-6 in.	X	X					X		1602914 745090

Table 3-6 (revised 4-26) Proposed Sediment Samples, cont'd

Sediments in perennial streams draining the site (Cont'd)											
Station	Media	Sample Type	Depth	Total Metals	Paste pH	ABA	TOC	SVOC / VOC	Pest. & PCBs	Total & WAD CN	Approximate Coordinates (Easting, Northing)
BH224	SD	Discrete	0-6 in.	X	X		X	X	X	X	1602960 745493
BH225	SD	Discrete	0-6 in.	X	X					X	1602638 745251
BH226	SD	Discrete	0-6 in.	X	X					X	1601956 745099
BH227	SD	Discrete	0-6 in.	X	X			X	X	X	1603739 743728
BH228	SD	Discrete	0-6 in.	X	X					X	1603924 743797
BH229	SD	Discrete	0-6 in.	X	X					X	1603972 743348
BH230	SD	Discrete	0-6 in.	X	X					X	1606453 742390
BH226	SD	Discrete	0-6 in.	X	X		X	X	X	X	1601956 745099
BH227	SD	Discrete	0-6 in.	X	X		X	X	X	X	1603739 743728
BH228	SD	Discrete	0-6 in.	X	X					X	1603924 743797
BH229	SD	Discrete	0-6 in.	X	X					X	1603972 743348
BH230	SD	Discrete	0-6 in.	X	X					X	1606453 742390
BH231	SD	Discrete	0-6 in.	X	X		X			X	1600103 744373

Sediment Parameter List

Sediment Solids

Total Metals	
Aluminum	Magnesium
Antimony	Manganese
Arsenic	Mercury
Barium	Molybdenum
Beryllium	Nickel
Cadmium	Potassium
Calcium	Selenium
Chromium	Silver
Cobalt	Sodium
Copper	Thallium
Iron	Vanadium
Lead	Zinc

Acid-Base Accounting

Neutraliz. Potential
Total Sulfur
Pyrite Sulfur
Sulfate Sulfur
Organic Sulfur

Others

Total CN
Pest. & PCBs
SVOC
VOC
WAD CN
Gold (Au)

Abbreviations

ABA - Acid base accounting (includes sulfur forms)
CN - Cyanide
PCBs - Polychlorinated biphenyls
Pest - Pesticides
SVOC - Semi-volatile organic compounds
VOC - Volatile organic compounds
TSS - Total suspended solids
TDS - Total dissolved solids
N - Nitrogen
TBD - To be determined

Table 3.3 - Summary of Samples, Analyses, Quality Control, and Containers
Barite Hill Mine Site, McCormick, McCormick County, South Carolina

Analysis	Analytical Method	Container Type	Preservative	Holding Time	Samples	QC Samples ^{1 2 3}				Total Numbers of Samples	Total Numbers of Containers
						Equipment Rinsate	Trip Blank	Field Duplicates	MS/MSD		
Monitoring Well Samples											
TAL Metals (Totals)	EPA SW-846 (Method 6010B or 6020 series)	1 x 1 L poly	HNO ₃ (pH<2), Ice to 4°C	180 days	42	2	0	3	2	49	49
TCL Semi-Volatile Organics	EPA SW-846 (Method 8270C)	2 x 1 L amber	Ice to 4°C	7 days	3	1	0	1	1	6	12
TCL Volatile Organics	EPA SW-846 (Method 8260B)	3 x 40-ml vials	HCl (pH < 2), Ice to 4°C	14 days	3	1	1	1	1	7	14
Pesticides/PCBs	EPA SW-846 (Method 8081B)	2 x 1 L amber	Ice to 4°C	48 days	3	1	0	1	1	6	12
Anions	EPA Method 300.0	1 x 500 mL poly	Ice to 4°C	28 days	42	2	0	3	2	49	49
Acidity	EPA Method 305.1	1 x 500 mL poly	Ice to 4°C	14 days	42	2	0	3	2	49	49
Alkalinity	EPA Method 310.1	1 x 500 mL poly	Ice to 4°C	14 days	42	2	0	3	2	49	49
TDS/TSS	EPA Methods 160.1, 160.2	1 x 1 L poly	Ice to 4°C	7 days	42	2	0	3	2	49	49
Nitrate/Nitrite/Ammonia	EPA Method 353.2	1 x 500 mL poly	Ice to 4°C	48 hours	42	2	0	3	2	49	49
Ferrous and Total Iron	HACH 8146	100 mL, no head space	None	immediate	42	2	0	3	0	47	47
Cyanide (Total and Free) ⁴	ASTM-D7511, D7237	1 x 500 mL poly	NaOH (pH>12), Ice to 4°C	14 days	42	2	0	3	2	49	49
Soil Samples											
TAL Metals (Totals)	EPA SW-846 (Method 6010B or 6020 series)	1 x 8 oz glass	Ice to 4°C	180 days	44	4	0	4	4	56	56
TCL Semi-Volatile Organics	EPA SW-846 (Method 8270C)	1 x 8 oz glass	Ice to 4°C	14 days	11	1	0	1	1	14	14
Volatile Organics	EPA Method 5035A	3 Encores ⁵ + one 2-oz moisture jar	Ice to 4°C	daily	11	1	1	1	1	15	15
Pesticides/PCBs	EPA Method 8082	3 x 5g Encores ⁵	Ice to 4°C	14 days	9	1	0	1	1	12	12
Cyanide (Total and WAD)	EPA 335.4, ASTM 2036	1 x 8 oz glass	Ice to 4°C	daily	22	1	0	1	1	25	25
Total Organic Carbon	EPA Method 415.1	1 x 8 oz glass	Ice to 4°C	28 days	16	1	0	1	0	18	18
Nutrients (Kjeldahl Nitrogen, phosphorous)	EPA Methods 351.2, 365.4	1 x 8 oz glass	Ice to 4°C	28 days	16	1	0	1	0	18	18
Paste pH ⁵	EPA 600/2-74-054	16 oz glass or poly bag	Ice to 4°C	none	44	0	0	4	0	48	48
Acid-Base Accounting (Sulfur forms & neutralization potential)	EPA 600/2-74-054	16 oz glass or poly bag	Ice to 4°C	none	17	0	0	1	0	18	18

(1) It is assumed that spiked samples will be obtained from EPA Region 4 SESD.

(2) A temperature blank will be included in each cooler shipped.

(3) A preservative blank will be included per shipment.

(4) Pre-preserved bottles usually have insufficient NaOH to keep pH>12 due to very acidic water. Field crew should keep extra NaOH pellets.

(5) Paste pH and ABA can be done from same container. Amt of material needed depends on grain size. Sand and finer, 8 oz is fine; pea gravel 16 to 32 oz; larger gravel to cobbles requires 2 gallon buckets. Ground water IDW shall be characterized using the results of the ground water analytical testing, in addition to drum analysis if needed.

Table 3-3 continued

Analysis	Analytical Method	Container Type	Preservative	Holding Time	Samples	QC Samples ^{1 2 3}				Total Numbers of Samples	Total Numbers of Containers
						Equipment Rinsate	Trip Blank	Field Duplicates	MS/MSD		
Surface Water Samples											
TAL Metals (Totals)	EPA SW-846 (Method 6010B or 6020 series)	1 x 1 L poly	HNO ₃ (pH<2), Ice to 4°C	180 days	35	2	0	2	2	41	41
TAL Metals (Filtered)	EPA SW-846 (Method 6010B or 6020 series)	1 x 1 L poly	HNO ₃ (pH<2), Ice to 4°C	180 days	20	1	0	1	1	23	23
TCL Semi-Volatile Organics	EPA SW-846 (Method 8270C)	2 x 1 L amber	Ice to 4°C	7 days	8	1	0	1	1	11	11
TCL Volatile Organics	EPA SW-846 (Method 8260B)	3 x 40-ml vials	HCl (pH < 2), Ice to 4°C	14 days	8	1	1	1	1	12	12
Pesticides/PCBs	EPA SW-846 (Method 8081B)	2 x 1 L amber	Ice to 4°C	48 days	8	1	0	1	1	11	11
Anions	EPA Method 300.0	1 x 500 mL poly	Ice to 4°C	28 days	35	2	0	2	2	41	41
Acidity	EPA Method 305.1	1 x 500 mL poly	Ice to 4°C	14 days	35	2	0	2	2	41	41
Alkalinity	EPA Method 310.1	1 x 500 mL poly	Ice to 4°C	14 days	35	2	0	2	2	41	41
TDS/TSS	EPA Methods 160.1, 160.2	1 x 1 L poly	Ice to 4°C	7 days	35	2	0	2	0	39	39
Nitrate/Nitrite/Ammonia	EPA Method 353.2	1 x 500 mL poly	Ice to 4°C	48 hours	35	2	0	2	2	41	41
Cyanide (Total and Free) ⁴	ASTM-D7511, D7237	1 x 500 mL poly	NaOH (pH>12), Ice to 4°C	14 days	35	2	0	2	2	41	41
Sediment Samples											
TAL Metals (Totals)	EPA SW-846 (Method 6010B or 6020 series)	1 x 8 oz glass	Ice to 4°C	180 days	29	2	0	2	2	35	35
Gold & platinum group	Fire assay	1 x 8 oz glass	Ice to 4°C	180 days	32	2	0	2	0	36	36
TCL Semi-Volatile Organics	EPA SW-846 (Method 8270C)	1 x 8 oz glass	Ice to 4°C	14 days	8	1	0	1	1	11	11
Volatile Organics	EPA Method 5035A	1 x 8 oz glass	Ice to 4°C	daily	8	1	1	1	1	12	12
Pesticides/PCBs	EPA Method 8082	1 x 8 oz glass	Ice to 4°C	14 days	6	1	0	1	1	9	9
Cyanide (Total and WAD)	EPA 335.4, ASTM 2036	1 x 8 oz glass	Ice to 4°C	daily	29	2	0	2	2	35	35
Total Organic Carbon	EPA Method 415.1	1 x 8 oz glass	Ice to 4°C	28 days	5	1	0	1	0	7	7
Paste pH ⁵	EPA 600/2-74-054	16 oz glass or poly bag	Ice to 4°C	none	21	0	0	1	0	22	22
Acid-Base Accounting (Sulfur forms & neutralization potential)	EPA 600/2-74-054	16 oz glass or poly bag	Ice to 4°C	none	3	0	0	1	0	4	4

(1) It is assumed that spiked samples will be obtained from EPA Region 4 SEDS.

(2) A temperature blank will be included in each cooler shipped.

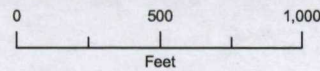
(3) A preservative blank will be included per shipment.

(4) Pre-preserved bottles usually have insufficient NaOH to keep pH>12 due to very acidic water. Field crew should keep extra NaOH pellets.

Tuesday, January 11, 2011 12:27:58 PM E:\EPA\110008551986 BariteHill\GIS\Map Docs\FSP\ Figure 3-2 Barite Soil 11111.mxd



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FIGURE 3-2

Proposed Soil Sampling Locations - Initial Phase
Barite Hill Mine, McCormick County, South Carolina

Tuesday, January 11, 2011 8:59:11 PM E:\EPA\11000855\986 BariteHill\GIS\Map Docs\FSP Figure 3-3 Barite SWSD 121510.mxd

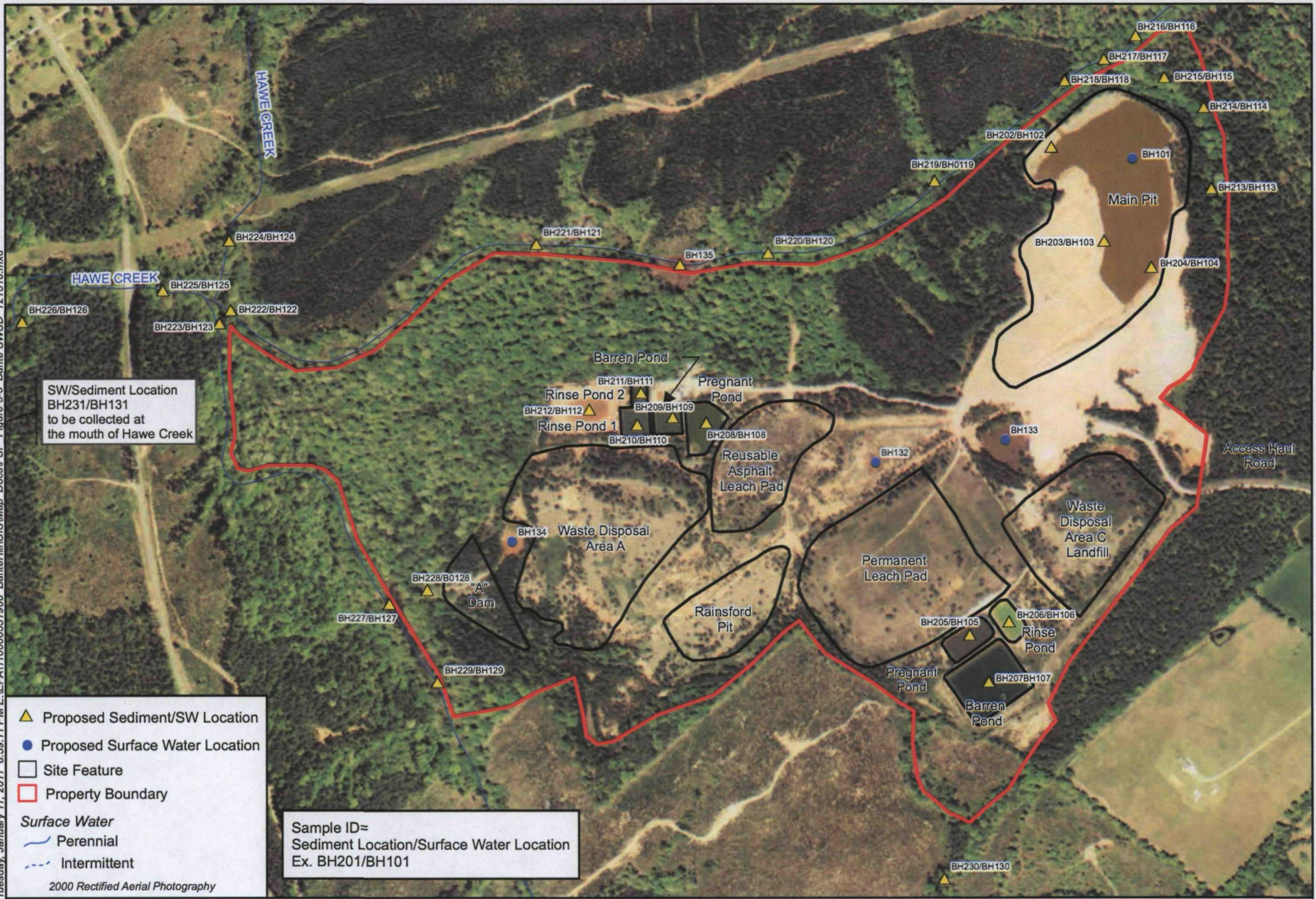
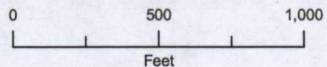


FIGURE 3-3

Proposed Surface Water and Sediment Sampling Locations - Initial Phase
Barite Hill Mine, McCormick County, South Carolina



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